



# State of Utah

DEPARTMENT OF NATURAL RESOURCES  
DIVISION OF OIL, GAS AND MINING

Michael O. Leavitt  
Governor


Robert L. Morgan  
Executive Director

Lowell P. Braxton  
Division Director

1594 West North Temple, Suite 1210  
PO Box 145801  
Salt Lake City, Utah 84114-5801  
(801) 538-5340 telephone  
(801) 359-3940 fax  
(801) 538-7223 TTY  
www.nr.utah.gov

January 7, 2003

TO: Minerals File

FROM: Paul Baker, Senior Reclamation Biologist 

RE: Site Technical Visit, Moab Salt, Cane Creek Mine, M/019/005, Grand County, Utah

Date of Inspection: December 12, 2002  
Time of Inspection: 9:20 a.m. to 2:45 p.m.  
Conditions: Mostly sunny, 40's  
Participants: Steve Viert and Erik Mohr, Cedar Creek Associates; Rick Klein, Moab Salt; Paul Baker, DOGM

## Purpose of Inspection:

The operator is considering how to best reclaim the evaporation ponds. The purpose was to meet with the operator's consultants and discuss different revegetation options.

## Observations:

With Mr. Viert and Mr. Mohr, I looked at the evaporation ponds and some of the areas around them. Some of the notable observations as they relate to reclamation include:

1. Many of the rock outcrops downhill from the ponds have salt accumulations that look much like stalactites and stalagmites (Photo 1). There is also water running in some of the drainages, and this indicates that the liners in the ponds leak and that the soils are probably contaminated with salt. Although we do not know the precise extent of salt contamination, we assume it is widespread.
2. There is one area from which soil was borrowed to make the dams, and little soil remains over the bedrock (Photo 2). Mr. Viert and Mr. Mohr were taking vegetation cover data in this area to see the effects on the vegetation of borrowing this soil.
3. There are several places where soil has been placed at the edges of the liners to hold the liners in place, and vegetation, mostly native, has become established in most of these areas (Photos 3 and 4). The consultants were taking vegetation cover data in these areas with the idea of relating it to a reclamation scenario where the liners are not removed. I anticipate the operator will submit the consultants' quantitative data, but my general impression was that there was a surprising amount of vegetation. The amount of cover may rival that in undisturbed areas.

4. There was one area where soil—basically sand—had blown on to the edge of the pond, and vegetation has become established above the water line in this area (Photo 5).
5. Some of the species we observed in the disturbed areas include alkali sacaton (*Sporobolus airoides*), sand dropseed (*S. cryptandrus*), *S. flexuosus*, *S. contractus*, giant dropseed (*S. giganteus*), Indian ricegrass, shadscale, gooseberryleaf globemallow, a blazing star and a lupine in bloom, rabbitbrush, and *Stephanomeira* sp. Some of the dropseeds seemed to prefer swales, and this is typical. There was quite a lot of rabbitbrush and shadscale in the soil over the pond liners, and shadscale, rabbitbrush, and some weeds seemed to dominate the soil borrow area.
6. The operator showed me the salt tailings area (Photo 6). Much of the salt that was stored in this area has been removed, and it should all be gone within a few years.

### Conclusions and Recommendations:

The operator is considering various options for reclaiming the evaporation ponds. They are concerned about protecting plants from the soils that are probably contaminated with salts and about minimizing costs. The consultants and I discussed two options for leaving the liners in place. The consultants feel it would be best to punch a limited number of holes in the liners, perhaps on a two-foot grid, and allow for drainage and some root penetration. The operator is apparently considering putting just one foot of soil over the top of the liners. The other option being considered, as it was described to me, is to put many holes in the liners almost to the point of shredding it.

My initial reaction to these concepts was not favorable because of the limited amount of soil and water storage capacity, but after seeing the amount of vegetation that has become established in areas with very limited soil, I think it may be feasible. Desert plants have various strategies for taking up water, and one of them that appears to be used in this area is to have shallow roots that can take up water quickly. Putting some holes in the liner would allow excess water to drain and leach salt from the vicinity of the holes. It would also allow roots of species with deeper roots, like some of the shrubs, to extend their roots more deeply and exploit at least some of the water going below the liner. At the same time, leaving most of the liner intact would tend to decrease or eliminate capillary rise of salts.

The Division does not have a proposal at this time, and the operator will need to submit a reclamation plan amendment together with supporting documentation before the Division can approve the changes being contemplated.

jb

cc: Moab Salt  
Will Stokes, SITLA

O:\M019-Grand\M0190005MoabSalt\final\ins121202ms.doc



# ATTACHMENT

Report Date: January 7, 2003; Inspection Date: December 12, 2002

## Photographs

M/019/005, Cane Creek Mine, Moab Salt



Photo 1. Stalactite- and stalagmite-like formations in one of the drainages below the evaporation ponds.

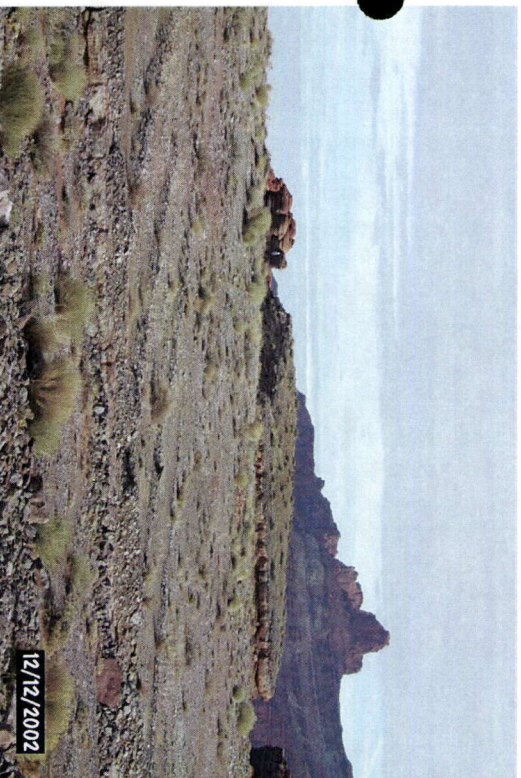


Photo 2. Area from which material was taken to build the dams.

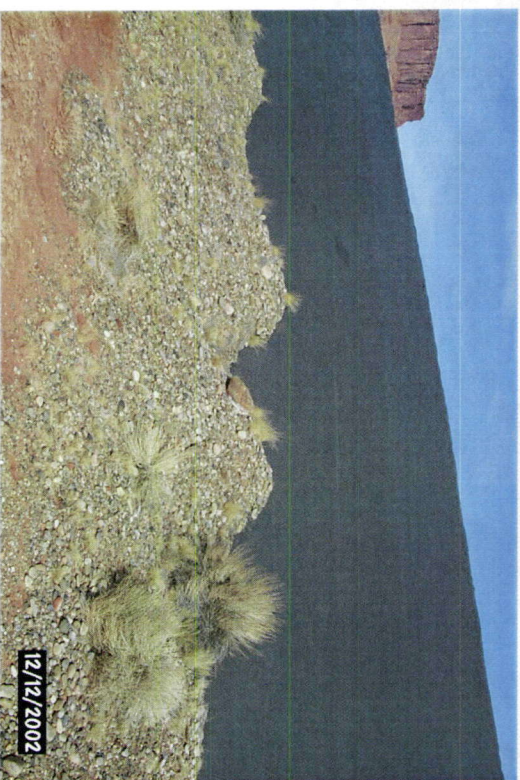


Photo 3. Soil piles on the edge of the liner. Note the amount of vegetation despite the small amount of soil. See also Photo 4.

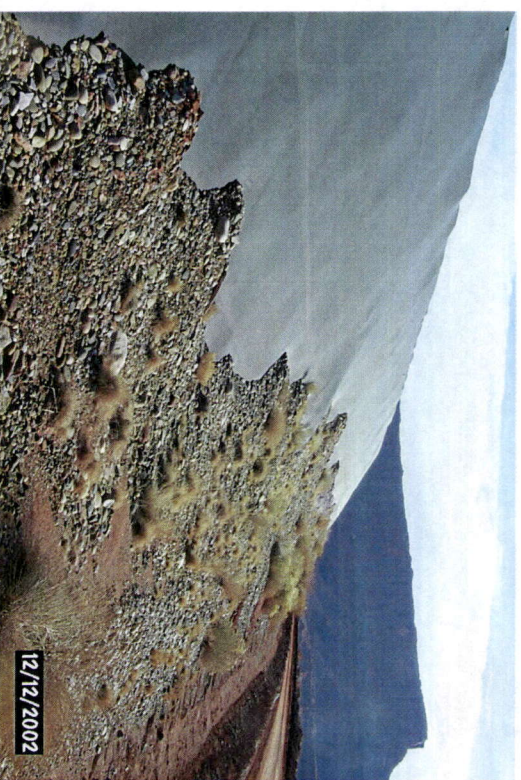


Photo 4.





**Photo 5.** Area at the edge of one of the ponds where soil has blown in. The high water mark is marked near the center of the photo with a black line.



**Photo 6.** The salt tailings area.